# Epitomes

## Important Advances in Clinical Medicine

# Urology

*The Scientific Board of the California Medical Association presents the following inventory of items of progress in urology. Each item, in the judgment of a panel of knowledgeable physicians, has recently become reasonably firmly established, both as to scientific fact and important clinical significance. The items are presented in simple epitome, and an authoritative reference, both to the item itself and to the subject as a whole, is generally given for those who may be unfamiliar with a particular item. The purpose is to assist busy practitioners, students, researchers, or scholars to stay abreast of these items of progress in urology that have recently achieved a substantial degree of authoritative acceptance, whether in their own field of special interest or another.*

*The items of progress listed below were selected by the Advisory Panel to the Section on Urology of the California Medical Association, and the summaries were prepared under its direction.*

Reprint requests to Division of Scientific and Educational Activities,
California Medical Association, PO Box 7690, San Francisco, CA 94120-7690

## Prostate-Specific Antigen

PROSTATE-SPECIFIC ANTIGEN (PSA) is a serine protease normally produced by prostatic epithelial cells and present in high concentrations in prostatic secretions. In normal men, it is present in the serum in minute quantities. Most pathologic states involving the prostate, however, have the potential to cause marked elevations of serum PSA concentrations. Bacterial prostatitis, benign prostatic hyperplasia, and prostate cancer all elevate serum PSA levels to varying degrees. Prostate-specific antigen has found the most widespread clinical application in the evaluation and management of patients with prostate cancer.

Prostate-specific antigen has displaced prostatic acid phosphatase as the preeminent tumor marker for prostatic adenocarcinoma. The combination of several key features makes PSA unique among known tumor markers. It is remarkably sensitive to the presence of prostate cancer. Serum PSA values are elevated in more than 95% of palpable cancers, including small palpable nodules (stage B1 lesions). Serum levels of PSA are remarkably proportional to both clinical stage and pathologic stage found at radical prostatectomy. In fact, careful pathologic studies show that serum PSA is directly proportional to the volume of prostate cancer. Because the clinical and pathologic stages of prostate cancer, perhaps more so than any other malignant neoplasm studied, also appear to be a direct function of tumor volume, PSA has proved a useful adjunct in staging. In untreated patients with prostate cancer who have undergone careful pathologic staging, it is almost unheard of to find regional lymph node metastases when serum PSA levels are less than 10 μg per liter by the Yang assay (about 5.5 μg per liter by the more commonly used Hybritech assay). In untreated patients with serum PSA levels above 75 μg per liter by the Yang assay (50 μg per liter by the Hybritech assay), nearly two thirds have lymph node metastases, three quarters have seminal vesical invasion by cancer, more than four fifths will have extensive tumor volume and surgical margin involvement, and all will have high-grade lesions. Unfortunately, as with any biologic system—especially a deranged biologic system, which cancer is by definition—exceptional patients with high-volume prostate cancers and high serum PSA values may have organ-confined disease, and patients with low-volume tumors and low PSA values may have early metastases. Also, because PSA is nonspecific for prostate cancer, serum levels may be elevated by coexistent prostatic disease, including bacterial prostatitis and benign prostatic hyperplasia. Therefore, although a valuable adjunct to our current clinical staging of patients with prostate cancer, measuring the PSA level does not eliminate the need for careful clinical assessment, including a digital rectal examination, technetium bone scans, and appropriate radiographic studies.

Prostate-specific antigen provides an excellent objective measure in observing patients with prostate cancer. Serum PSA levels rise over time and correlate with clinical progression of the disease process in untreated patients with prostate cancer. Moreover, exponential increases in serum PSA levels usually precede clinical disease progression and may allow preemptive treatment planning. Any successful treatment of prostate cancer dramatically affects serum PSA levels. In patients responding to androgen ablation, serum PSA levels fall precipitously, with nadir values typically reached by 3 to 6 months. After radiotherapy, PSA values fall in a similar manner but with a more prolonged time course, and nadir values are reached at 12 to 18 months. Patients for whom either androgen ablation or radiotherapy fails also behave similarly, with exponentially rising serum PSA values usually preceding symptomatic clinical recurrence or progression.

One clearly defined use for PSA is in observing patients after radical prostatectomy. These patients, if their cancer and prostate are completely surgically excised, should have no PSA in their serum. Given the serum half-life of the PSA molecule (between 2.2 and 3.2 days), most patients should have zero serum PSA values by three weeks, and all should be zero by six weeks. The persistence or recurrence of PSA in the serum after radical prostatectomy accurately predicts residual or metastatic cancer and usually presages clinical disease recurrence by many months or years.

JOHN N. KABALIN, MD
*Palo Alto, California*

### REFERENCES

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